02-18-00 A

ASSISTANT COMMISSIONER FOR PATENTS
BOX PATENT APPLICATION
Washington, D.C. 20231

DOCKET NO. YOR9-2000-0004
Date: February 17, 2000

02/17/00 JC760 U.S. PTO

jc525 U.S. PTO 09/505509 02/17/00

Sir:

Transmitted herewith for filing is the Patent Application/of: under Rule 1.53(f)

Inventors: MANISH GUPTA, SANDEEP JUNEJA

For: A DISTRIBUTED BID PROCESSING METHOD FOR OPEN-CRY AND DESCENDING PRICE AUCTIONS

Enclosed are:

X 7 Sheets of Informal Drawings.

____ An assignment of the invention to International Business Machines Corporation, Armonk, New York 10504.

____ A certified copy of a _____ application.

X Unsigned Declaration and Power of Attorney is attached to the application.

____ Associate Power of Attorney.

X Information Disclosure Statement with form PTO-1449 with references attached.

The filing fee has been calculated as shown below:

	(Col. 1)	(Col. 2)	OTHER THAN A SMALL ENTITY	
FOR:	NO. FILED	NO. EXTRA	RATE	FEE
BASIC FEE				$ 690.00
TOTAL CLAIMS	10 - 20 =	0	X $ 18 =	$ 0.00
INDEP CLAIMS	1 - 3 =	0	X $ 78 =	$ 0.00
___ MULTIPLE DEPENDENT CLAIM PRESENTED			+ $ 260=	$ 0.00
			TOTAL	$ 690.00

If the difference in Col. 1 is less than zero, enter "0" in Col. 2.

x Please charge my Deposit Account No. 09-0468 in the amount of $ 690.00 .

x The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 09-0468. A duplicate copy of this sheet is enclosed.

x Any additional filing fees required under 37 CFR 1.16.

x Any patent application processing fees under 35 CFR 1.17.

Respectfully submitted,

By Stephen C. Kaufman

Stephen C. Kaufman
Registration No.: 29,551
Tel. (914)945-3197

IBM CORPORATION
INTELLECTUAL PROPERTY LAW DEPT.
P.O. BOX 218
YORKTOWN HEIGHTS, NY 10598

Express Label EL480513373US
Date of Deposit: Feb. 17, 2000

Express Label EL480513373US
Date of Deposit: Feb. 17, 2000

A DISTRIBUTED BID PROCESSING METHOD FOR OPEN-CRY AND DESCENDING PRICE AUCTIONS

DESCRIPTION

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention generally relates to electronic auctions and, more particularly, to a distributed bid processing method for open-cry and descending price auctions.

Background Description

Most business activity on the Internet is limited to publicizing the business opportunity and conducting catalog based sales, but it will rapidly expand to include the negotiations conducted to settle the price of the goods or commodities being traded. These negotiations are currently conducted by human intermediaries through various forms of auctions, bidding systems for awarding contracts, and brokerages. The role of the intermediaries can now be performed by Internet trading applications at a fraction of the cost. Trading on the Internet allows a business to reach a larger number of potential customers and suppliers in a shorter time and a lower cost than possible by other modes of communication, and to settle business transactions with lower cost overhead in a shorter time. Hence the rapid emergence of Internet based trading applications. See Manoj Kumar and Stuart I. Feldman, "Internet Auctions", http://www.ibm.com/iac/papers/auction_fp.pdf, 1998.

Auctioned or brokered sales are the norm in the business world for negotiating trades of large value. But consumer sales and small scale purchases typically stay with fixed prices, perhaps because of the high overhead cost of using the auction or brokerage method. The new economics of the Internet will make auctions popular in consumer and small business transactions as well. H. G. Lee and T. H. Clark in "Impact of the Electronic Marketplace on Transaction Cost and Market Structure", *International Journal of Electronic Commerce*, Vol. 1, No. 1, Fall 1996, at pages 127–149, present economic forces underlying this transition. Several success stories about Internet auctions are cited by Efraim Turban in "Auctions and Bidding on the Internet: An Assessment", *International Journal of Electronic Markets*, Vol. 7, No. 4, http://www.electronicmarkets.org/.

Different Auction Methods

The commonly used auction types are the open-cry auctions, single and multiple round sealed bid auctions and descending-price auctions. In an open-cry auction, also called an "English auction", the buyers gather at a common location, physical or virtual, at the pre-specified time. Each buyer can hear the bid submitted by a rival buyer and has a limited time to respond to it with a higher counter-bid. In physical auctions, the responses must be received within seconds, while in Internet auctions it is conceivable that several minutes or hours will be allowed for the response. In a sealed bid auction the buyers are required to submit their bids by a specified deadline. The auctioneer keeps the bid information secret until the deadline, at which time the bids are evaluated and the winners are declared. Single round sealed bid auctions lack the competitive atmosphere (bidding frenzy) in open cry auctions which encourages the bidders to outbid their rivals. Multiple round sealed bid

auctions rectify this situation. In a multiple round sealed bid auction, there is a deadline for each round of bids, and at that deadline either the auction is closed or the bids from the current round are publicized and a fresh round of bids is solicited by some new deadline.

Descending price auctions (also known as "Dutch auctions" in literature as described for example by M. Kumar and S. I. Feldman in "Business Negotiations on the Internet", *Proc. Inet '98*, Geneva, Switzerland, July 21–23, 1998) are better suited for perishable items such as vegetables or airplane seats. Here the auctioneer starts with a very high asking price. Then he gradually decreases his asking price until buyers emerge with bids specifying how many items they will purchase at the current asking price. He can continue lowering his bid to maintain a stream of buyers while the inventory lasts. Furthermore, he can control how fast he depletes his inventory by controlling the rate at which he lowers the bid.

Each of these auction methods has subtle variations such as:

- Anonymity, i.e., what information is revealed during the auction and after the auction closes. For example, the identity of the bidders could be concealed. In a sealed bid auction the final winning prices could be kept confidential. In all auctions the amount of inventory may or may not be announced in advance.
- Rules for ending descending price and open cry auctions. Open-cry auctions may end at a posted closing time. Alternatively the auctions could be kept open so long as new bids continue to arrive within some time interval of the preceding bid. This interval would be several minutes in an Internet auction and a few seconds for an auction being conducted in a meeting room. One could also choose to close the auction if either of the above two conditions is met or only when both conditions are met. Descending price auctions could close at a pre-

specified time, when all the inventory has been sold, when the price has fallen to a pre-specified level, or at some combination of these three conditions.

- Once the bidding phase is over, the bidders with the highest bids get the item being auctioned, but the price they pay could be the same as what they bid or lower. In a Discriminative Auction, also known as "Yankee auction", the winners pay what they bid. In a non-discriminative auction people with winning bids pay the price paid by the winning bidder with lowest bid (this is currently the trend on the internet; sites like www.ebay.com use this methodology for auctioning off multiple items and surprisingly this variation of auction is known as "Dutch auction" but is not a descending price auction). Finally, in an auction for a single item, in a "Vickrey auction", as described by David Vickrey in "Counter Speculation, Auctions, and Competitive Sealed Tenders", *The Journal of Finance*, March 1961, at pages 9–37, the winner pays the price bid by the second highest bidder. "Vickrey auctions" are also referred to as second price sealed bid auctions.
- Restrictions on bid amount: In all auctions the seller can specify the minimum starting bid. To speed up the bidding process minimum bid increments are often enforced. The bid increment is roughly proportional to the current bid, i.e., they are smaller for lower bids and larger at higher bids. In the open cry auctions for multiple items (i.e., "Dutch auction") on sites like www.ebay.com, there is no minimum increment. The only thing that is expected from the bidder when he bids is that the bid value should be greater than or equal to the minimum starting bid value. The seller may also be allowed to specify a reserve price, which is a lower limit on price acceptable to seller. The buyers may know that a reserve price exists but they may not know

what the reserve price is.

SUMMARY OF THE INVENTION

According to this invention, we focus on open-cry and descending price auctions (including the variations as described above) of single or multiple copies of indivisible goods. We provide methods wherein bids for an auction can be processed and some bids filtered out in a decentralized manner using multiple nodes (processors). Each node could be a shared-memory multiprocessor, or a distributed memory multiprocessor. These nodes could sit in a room or could be placed geographically far apart.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, aspects and advantages will be better understood from the following detailed description of a preferred embodiment of the invention with reference to the drawings, in which:

Figure 1 is an illustration of the decentralized model for processing bids of an open-cry or descending price auction for multiple items according to the invention;

Figure 2 is a flow diagram of the Current Global Winner (CGW) determination method;

Figure 3 is a flow diagram of the processing of bid(v,q) in a first Current Local Winner (CLW1) determination method according to the invention;

Figure 4 is a flow diagram of the processing of bid(v,q) in a second Current Local Winner (CLW2) determination method according to the invention;

Figure 5 is a flow diagram of the main algorithm used to process bid(v,q) at a node;

Figure 6 is a flow diagram of the CGW2 method used to process a bid(v,q) in a descending price auction at a node; and

Figure 7 is a flow diagram of the CLW3 method used to process a bid(v,q) in a descending price auction at a node.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

Referring now to the drawings, and more particularly to Figure 1, there is shown the general model for processing bids of an open-cry and descending price auction. Each computer 10_1, 10_2, . . ., 10_n represents a server or node in a distributed computing system. The input to each computer is a set of bids of a given auction and the output is the set of loser bids (those bids which can never be part of the winning set) and also those which are potential winners.

Each node could get the bids input to it from a database, or from another node, or from over the Internet (i.e., directly from the client/bidder who has sent the bid). A bidder could place a new bid or could place a modification of a bid placed by him in the past (see "Internet Auctions" by Kumar and Feldman, *supra*).

Open-Cry Auctions

In the current state of the art of auction procedure, every time any node (i.e., server) processes a set of bids, it determines the global winners; i.e., it determines the winning bids amongst all the bids received thus far. These winning bids are selected based on pre-specified rules. We call this the

Current Global Winner (CGW) determination method and discuss it below.

Our invention is to introduce two Current Local Winner (CLW) determination methods, also described below. Each CLW method determines a set of potential winners from observing a set of bids, and rejects the remaining bids as loser bids. A potential winner from a CLW determination method may again be processed by a CLW determination method or finally by a CGW determination method. The purpose of the CLW determination method is to filter out loser bids quickly so that improved response times are achieved and the global method (i.e., the CGW) is not impeded by heavy traffic. Two algorithms of the CLW determination method are given below.

The Current Global Winner (CGW) determination process is shown in Figure 2. The CGW determination method considers bids (that have not been declared losers) and, using pre-specified auction bidding rules, decides the set of current winner bids for auctioning N copies of a single item. A new bid(v,q) input at 201 is examined in decision block 202 to determine if the new bid is a modification and the original bid is currently a winner. If not, then to decide whether a bid is a winner or a loser, the process takes this bid along with the set of all bids that have been processed 203 (declared either winning or losing in the auction in the past) and determines a new set of winners in function block 204 (using the auction bidding rules, defined below). Note that if the bid under consideration were a modification of a bid (let us call it the parent bid) submitted by the bidder in the past and the parent bid is currently a winning bid as determined in decision block 202, then the processing simply involves updating the bid value of the parent bid to the bid value v of the bid under consideration in function block 205. Notification is sent to the bidder of bid(v,q) in function block 206. After the new set of winners is computed in function block 204, a determination is made in decision block 207 as to whether bid(v,q) is a winner or a loser. If a loser, then notification is sent to

the bidder of bid(v,q) in function block 206. If a winner, a message is sent to the bidder apprizing him of this status in function block 208.

An example of auction bidding rules for multiple items (taken from www.cnet.com) are:

1. When there are two bids at different prices, the higher value bid always wins.
2. When there are bids at the same price but different in quantities, the higher quantity bid wins.
3. When there are bids at the same price and equal in quantities, the bidder who placed his/her first bid earlier wins. Bidders may rebid after being outbid and the server will retain their initial bid time.

Another example of open-cry auction bidding rules are:

1. A bid is processed to be winner if the bid value (per item) of the bid is greater than or equal to the current highest bid plus the increment.
2. If two or more bids arrive at the auction and both have the same bid value then the tie will be broken based upon the time of arrival. The bid to arrive first will be considered first, and so on.
3. At the end of the auction the items will be allocated to the bids in the decreasing order of the bid value (per item). That is the bid with the highest bid value is considered first and then the next highest bid, and so on.

Further examples of such bidding rules may be found at www.yahoo.com, www.ebay.com, etc.

In the Current Local Winner determination process 1 (CLW1) shown in Figure 3, a new bid(v,q) is input at 301 and in decision block 302, a Segregation Filter is used. This filter process considers a bid (v,q), where v

denotes the price per unit and q denotes the quantity desired. It checks to see if this bid ranks in the top $\lfloor N/q \rfloor$ bids (in terms of price/unit bid value) amongst all the bids asking for quantity q whose information is available to this process, $\lfloor x \rfloor$ stands for the greatest integer less than or equal to x. Also recall that N denotes the number of copies of a single item on sale. In decision block 302, a determination is made as to whether the new bid is a modification and the original bid is in the top $\lfloor N/q \rfloor$ bids asking for quantity q. If so, the value v of the original bid is updated in function block 303. If not, then to decide whether a bid is a winner or a loser, the process takes this bid along with the set of $\lfloor N/q \rfloor$ bids that have been processed 304 and determines a new set of top $\lfloor N/q \rfloor$ bids in function block 305. A determination is then made in decision block 306 to determine if bid(v,q) is in the top $\lfloor N/q \rfloor$ bids. If it is not, it is deemed a loser bid, as it can never be a winning bid, and notification is sent to the bidder in function block 307. If it is in the top $\lfloor N/q \rfloor$ bids, it is declared a candidate bid and a check is made to see if another bid has dropped from the list of top $\lfloor N/q \rfloor$ bids and, if so, then that bid is considered a loser bid and notification is sent to that bidder in function block 308. The candidate bid is held for time, τ, in function block 309. If by time τ, through an arrival of another bid, a candidate bid loses its position amongst the top $\lfloor N/q \rfloor$ highest bids, it is considered a loser bid. Otherwise it is considered a winner candidate from this process and is made accessible for further processing.

This time τ need not be a constant. It may be set to be a decreasing function of the bids position amongst top $\lfloor N/q \rfloor$ highest bids. The higher the position, the less the wait before the bid is moved to the next level of processing. The lower the position, the higher the wait and hence the higher the possibility that the incoming bids may knock this bid from the candidate winners list. Also, in case of available capacity or other reasons (e.g., priority given to a bidder), a candidate bid may be used by another process even before

time τ has expired. Note that in case the bid (v,q) were a modification of a bid submitted by the bidder in the past and the original bid happens to lie in the top $\lfloor N/q \rfloor$ bids (asking for quantity q), then the processing simply amounts to updating the bid value of the original bid to v.

In the Current Local Winner Determination process 2 (CLW2) shown in Figure 4, a new bid(v,q) is input at 401 and in decision block 402, a determination is made as to whether the new bid is a modification and the original bid is currently a winner. As in the previous methods, if the bid under consideration is a modification and the original bid is currently a winning bid amongst the bids, whose information is available to this method, then the processing simply amounts to updating the bid value v in function block 403, and notification is sent to the bidder in function block 404. This process uses a Buffer Filter. This filter process considers a set of bids 405, whose information is available to this process, unsegregated by quantity and uses a set of pre-specified auction rules identical to the CGW determination method in every respect except that it selects winners for auctioning $N+x$ copies of the item (recall that the CGW method considered N copies) on sale in function block 406. A determination is made in decision block 407 as to whether the bid(v,q) is a winner. These winner bids are called *candidate* winner bids and can be processed using other methods in function block 408. The losers are referred to as loser bids, and notification is sent to the bidders in function block 404.

The buffer x is decided based on trade-off between the degree of filtration needed and the accuracy of the process. The smaller x, the more the bids rejected and hence higher the degree of filtration. On the other hand, for small x it is possible (though unlikely) that we may reject bids that would have been part of the winner set if only CGW process was used and CLW was never used.

Algorithm for Processing a Bid

We now describe the main algorithm that a node executes to process a bid input to it. The process is shown in Figure 5. A node takes a bid (v,q) for processing at input block 501. A determination is first made in decision block 502 as to whether administrative tasks have been completed. If so, it chooses one method out of the methods CGW, CLW1, and CLW2 to process the bid in function block 503. The choice of the method could be based on the priority assigned to the bid, the incoming traffic to the auction, etc. The bid is processed using the chosen method. If the administrative tasks have not been completed, as determined in decision block 502, the node also has to perform other tasks in function block 504 before it can decide whether a bid is a loser or a winner. These tasks are:

1. checking for the credit balance of the bidder (if needed in the auction),
2. whether the bid is above the starting price,
3. assigning a time stamp of arrival to the bid, and
4. assigning the bid to the database (the database could be global or it could be distributed), etc.

Note that all these tasks can be accomplished by dedicated nodes. Although we have considered ascending price open cry auctions, the same ideas hold true when it is a descending price (also known as "reverse") open cry auction. In a descending price open cry auction, the bid increment is negative and winners are determined from amongst the lowest bids received as opposed to the highest bids in an ascending price open cry auction.

Descending Price Auction

As we described above, the distinguishing feature of a descending

price auction is that the supplier (or auctioneer) decrements the asking price (per unit). The amount by which the price is decremented could be different for different decrement epochs in time. Upon a price decrement, it may happen that a large number of buyers bid simultaneously (because the asking price is within their reach). This may over load the auction server. We first present the method that is currently used for processing bids of a descending price auction. We next present a method, which also is part of our invention, that can filter out loser bids and thus help in reducing the load and improve response time to the buyers. Both these methods work together to reduce the processing load. Let R be the remaining number of copies of the item on auction (note that $R = N$ at the start of the auction).

CGW 2: Descending Price Global Algorithm

This algorithm is shown in Figure 6. Take a bid (q) for processing, where q is the quantity desired at going price p, input at 601. The currently remaining quantity R on auction are obtained at 602. While the node, that is running this method, reads the available quantity on auction, no other process on any node can modify this value (for example, if the value R lies in a database, like IBM's DB2, then it amounts to reading R by obtaining a lock on it in the "share" or "exclusive" mode). A determination is made in decision block 603 as to whether $q \leq R$ or $q > R$ and the bidder is ready to accept a partial quantity. If $q \leq R$ or q > R but the bidder is ready to accept partial quantity, then the method modifies the value of R to max (0, $R-q$) in function block 604. Also the method may send a notification to the bidder that his bid is accepted, etc. On the other hand if $q > R$ and the bidder is not ready to accept partial quantity, then a notification may be sent apprizing him of this situation in function block 605.

CLW 3 :Descending Price Filter

This process is shown in Figure 7. Take a bid (q) for processing, where q is the quantity desired at going price p, at input 701. A determination is made in decision block 702 as to whether the bid is in the first $\lfloor R/q \rfloor$ bids, asking for quantity q at price p. If the bid is in the first $\lfloor R/q \rfloor$ bids (asking for quantity q at the going price p) processed by the method, then the bid is a candidate winner bid; otherwise, it is a loser. A candidate winner bid is available for further processing at function block 703. In the case of a loser bid, notification is sent to the bidder at function block 704. Each bid that is processed by the method either carries a time stamp of arrival or is given at the node while processing. It is assumed that if the time stamp already exists on the bid, then it must be greater than or equal to the time stamp of any bid (asking for quantity q at going price p) that has been processed by the method in the past.

The main algorithm executed at each node is same as in the open-cry auction case, except that instead of CGW, CLW1, and CLW2 methods we now have CGW2 and CLW3 methods which can be chosen by a node to process a bid.

While the invention has been described in terms of preferred embodiments, those skilled in the art will recognize that the invention can be practiced with modification within the spirit and scope of the appended claims.

CLAIMS

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is as follows:

1. A distributed method for processing auction traffic using one or more servers at a plurality of nodes in a distributed processing system comprising the steps of:

using a current local winner determination method at each of the nodes to quickly identify loser bids and candidate winning bids; and

using a current global winner determination method to determine from the candidate winning bids from each of nodes a current set of winners.

2. The method of claim 1, wherein the auction is an open-cry auction.

3. The method of claim 2, wherein the current local winner determination method comprises the steps of:

receiving a new bid(v,q) at a node, where v denotes the price per unit and q denotes the quantity desired;

checking to see if the new bid ranks in the top $\lfloor N/q \rfloor$ bids, in terms of price/unit bid value, amongst all the bids asking for quantity q whose information is available to this process, where $\lfloor x \rfloor$ stands for the greatest integer less than or equal to x;

taking the new bid along with the set of $\lfloor N/q \rfloor$ bids that have been processed and determining a new set of top $\lfloor N/q \rfloor$ bids;

determining if bid(v,q) is in the top $\lfloor N/q \rfloor$ bids and, if it is not, declaring it a loser bid, but if so, declaring it a candidate bid.

4. The method of claim 3, further comprising the steps of:

holding the candidate bid at the node for a time, τ; and

if by time τ, through an arrival of another bid, a candidate bid loses its position amongst the top $\lfloor N/q \rfloor$ highest bids, declaring the bid a loser bid;

otherwise, declaring the bid a winner candidate and making the bid accessible for further processing by the current global winner determination method.

5. The method of claim 4, wherein the current global winner determination method comprises the steps of:

receiving new candidate winning bid from a node bid(v,q);

taking the candidate winning bid along with the set of all bids that have been processed and determines a new set of winners;

determining whether the new candidate bid(v,q) is a winner or a loser; and

notifying the bidder of bid(v,q) as to whether they are a winner or loser.

6. The method of claim 2, wherein the current local winner determination method comprises the steps of:

receiving a new bid(v,q) at a node, where v denotes the price per unit and q denotes the quantity desired;

considering a set of bids using a set of pre-specified auction rules and selecting winners for auctioning $N+x$ copies of the item on sale; and

determinating whether the bid(v,q) is a candidate winner bid.

7. The method of claim 6, wherein the current global winner determination method comprises the steps of:

receiving new candidate winning bid from a node bid(v,q);

taking the candidate winning bid along with the set of all bids that have been processed and determines a new set of winners;

determining whether the new candidate bid(v,q) is a winner or a loser; and

notifying the bidder of bid(v,q) as to whether they are a winner or loser.

8. The method of claim 1, wherein the auction is a descending auction.

9. The method of claim 8, wherein the current local winner determination method comprises the steps of:

receiving a bid (q) for processing, where q is the quantity desired at going price p;

determinating whether the bid is in the first $\lfloor R/q \rfloor$ bids, asking for quantity q at price p, where $\lfloor x \rfloor$ stands for the greatest integer less than or equal to x and R is a currently remaining quantity on auction;

if the bid is in the first $\lfloor R/q \rfloor$ bids, asking for quantity q at the going price p, then declaring the bid a candidate winner bid; and

making the candidate winner bid available for further processing by the current global winner determination method.

10. The method of claim 9, further comprising the steps of:

giving bids processed by the method a time stamp of arrival; and

determining whether the time stamp, if it exists on the bid, is greater than or equal to the time stamp of any bid, asking for quantity q at going price p, that has been processed by the method in the past.

A DISTRIBUTED BID PROCESSING METHOD FOR OPEN-CRY AND DESCENDING PRICE AUCTIONS

ABSTRACT OF THE DISCLOSURE

A distributed bid processing method uses a number of computers to process bids for a given open-cry auction or descending price auction in a distributed manner. The computers examine a set of bids and quickly filter out the losing bids. This helps in achieving faster processing and reduces response times. Two methods are developed for open-cry auctions and one for descending price auction. The methods apply to a distributed web server where some servers may be placed far apart geographically.

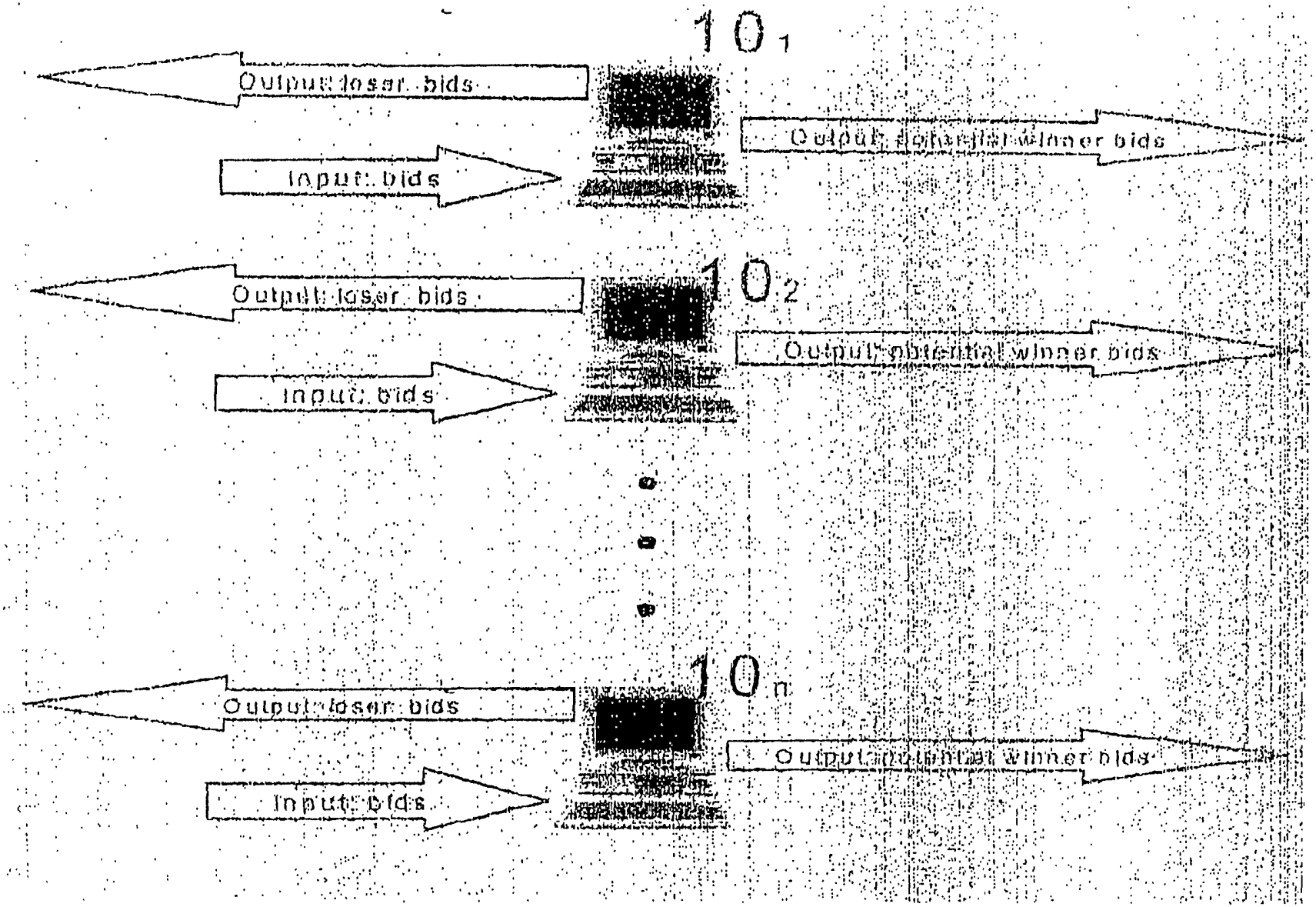
10 1
Output: loser bids
Output: potential winner bids
Input: bids
10 2
Output: loser bids
Output: potential winner bids
Input: bids
10 n
Output: loser bids
Output: potential winner bids
Input: bids

FIG. 1

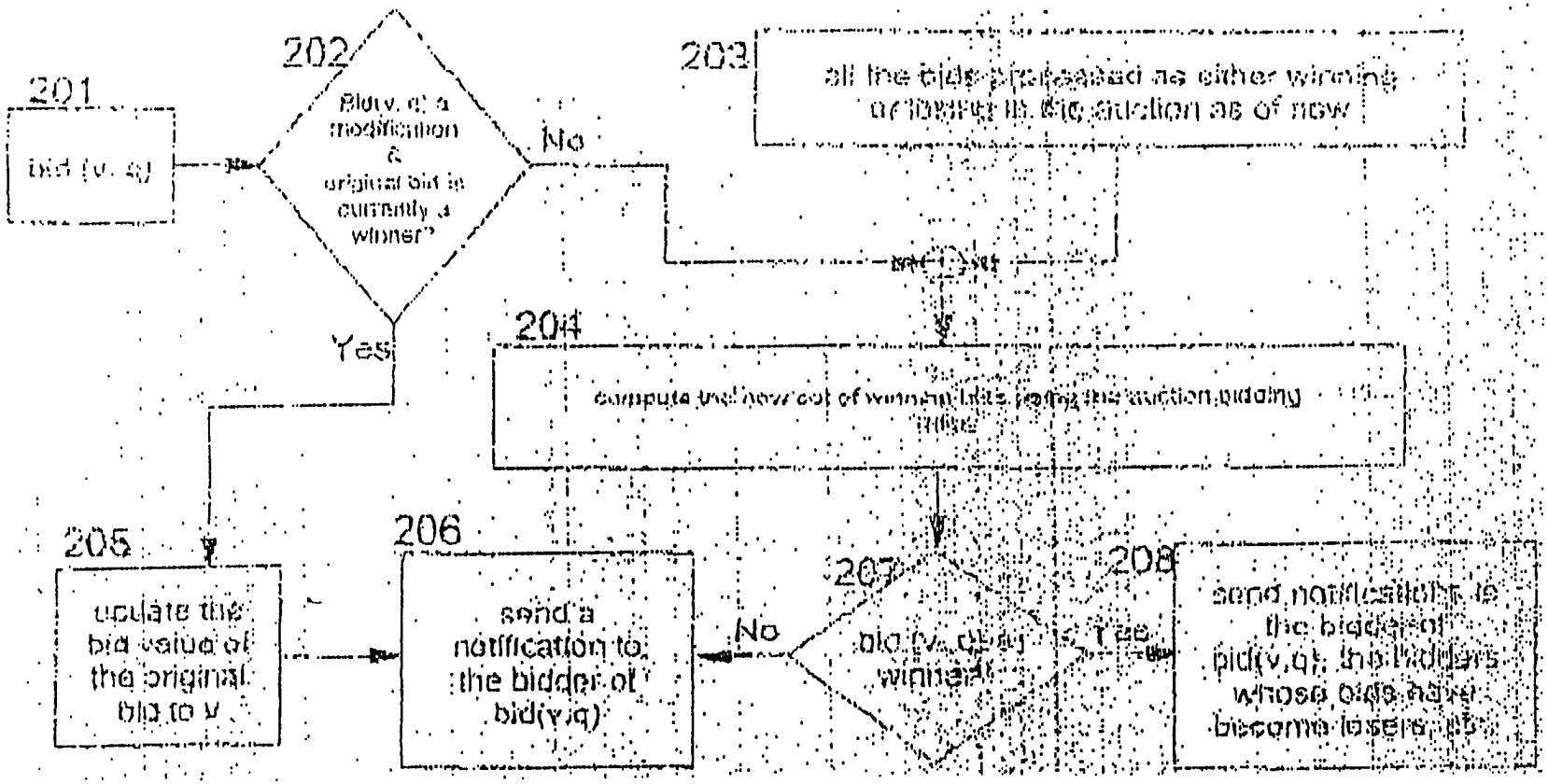
201
bid (v, q)
202
Bid v, q is a modification & original bid is currently a winner?
No
Yes
203
all the bids are released as either winning or lose in the auction as of now
204
compute the new set of winning bids using the auction pricing rule
205
update the bid value of the original bid to v
206
send a notification to the bidder of bid(v,q)
207
bid (v, q) is a winner?
No
Yes
208
send notification to the bidder of bid(v,q), the bidders whose bids have become losers, etc

FIG. 2

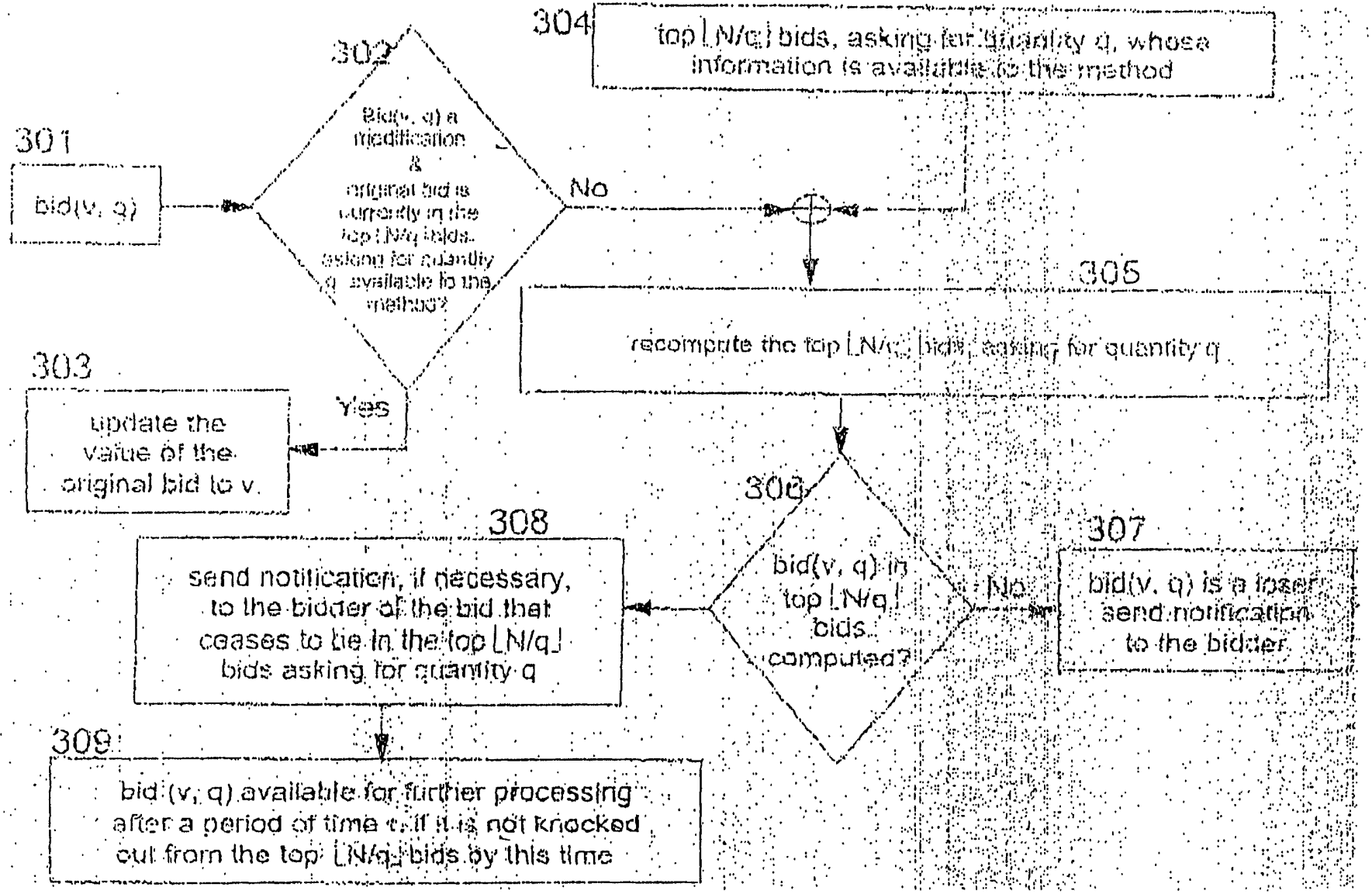
301
bid(v, q)
302
Bid(v, q) a modification & original bid is currently in the top ⌊N/q⌋ bids asking for quantity q available to the method?
No
Yes
303
update the value of the original bid to v
304
top ⌊N/q⌋ bids, asking for quantity q, whose information is available to the method
305
recompute the top ⌊N/q⌋ bids asking for quantity q
306
bid(v, q) in top ⌊N/q⌋ bids computed?
No
307
bid(v, q) is a loser send notification to the bidder
308
send notification, if necessary, to the bidder of the bid that ceases to lie in the top ⌊N/q⌋ bids asking for quantity q
309
bid (v, q) available for further processing after a period of time t, if it is not knocked out from the top ⌊N/q⌋ bids by this time

FIG. 3

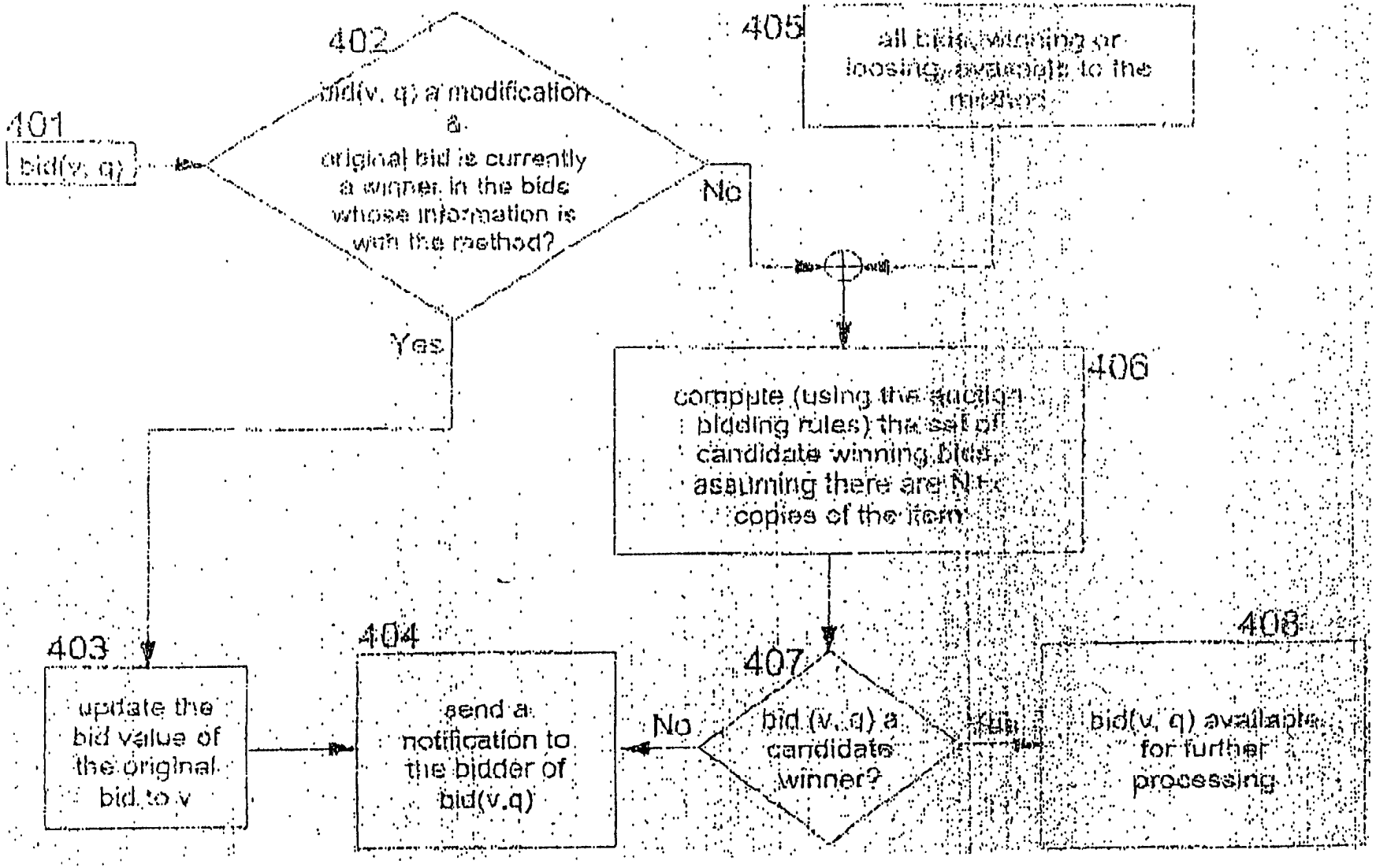
401
bid(v, q)
402
bid(v, q) a modification & original bid is currently a winner in the bids whose information is with the method?
No
Yes
405
all bids winning or loosing, available to the method
406
compute (using the auction bidding rules) the set of candidate winning bids, assuming there are N+c copies of the item
403
update the bid value of the original bid to v
404
send a notification to the bidder of bid(v,q)
407
bid (v, q) a candidate winner?
No
Yes
408
bid(v, q) available for further processing

FIG. 4

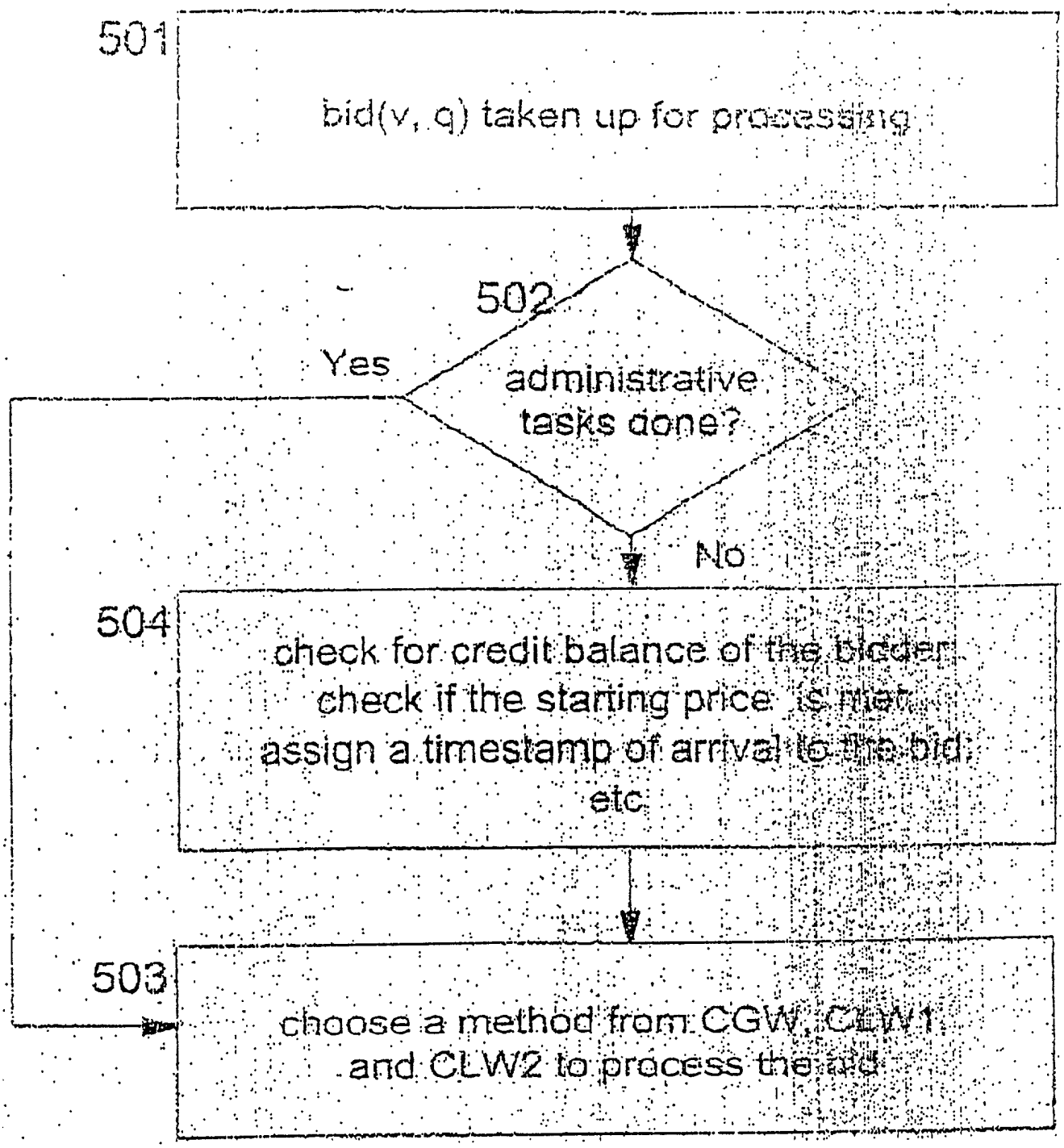
501
bid(v, q) taken up for processing
502
administrative tasks done?
Yes
No
504
check for credit balance of the bidder
check if the starting price is met
assign a timestamp of arrival to the bid
etc
503
choose a method from CGW, CLW1 and CLW2 to process the bid

FIG. 5

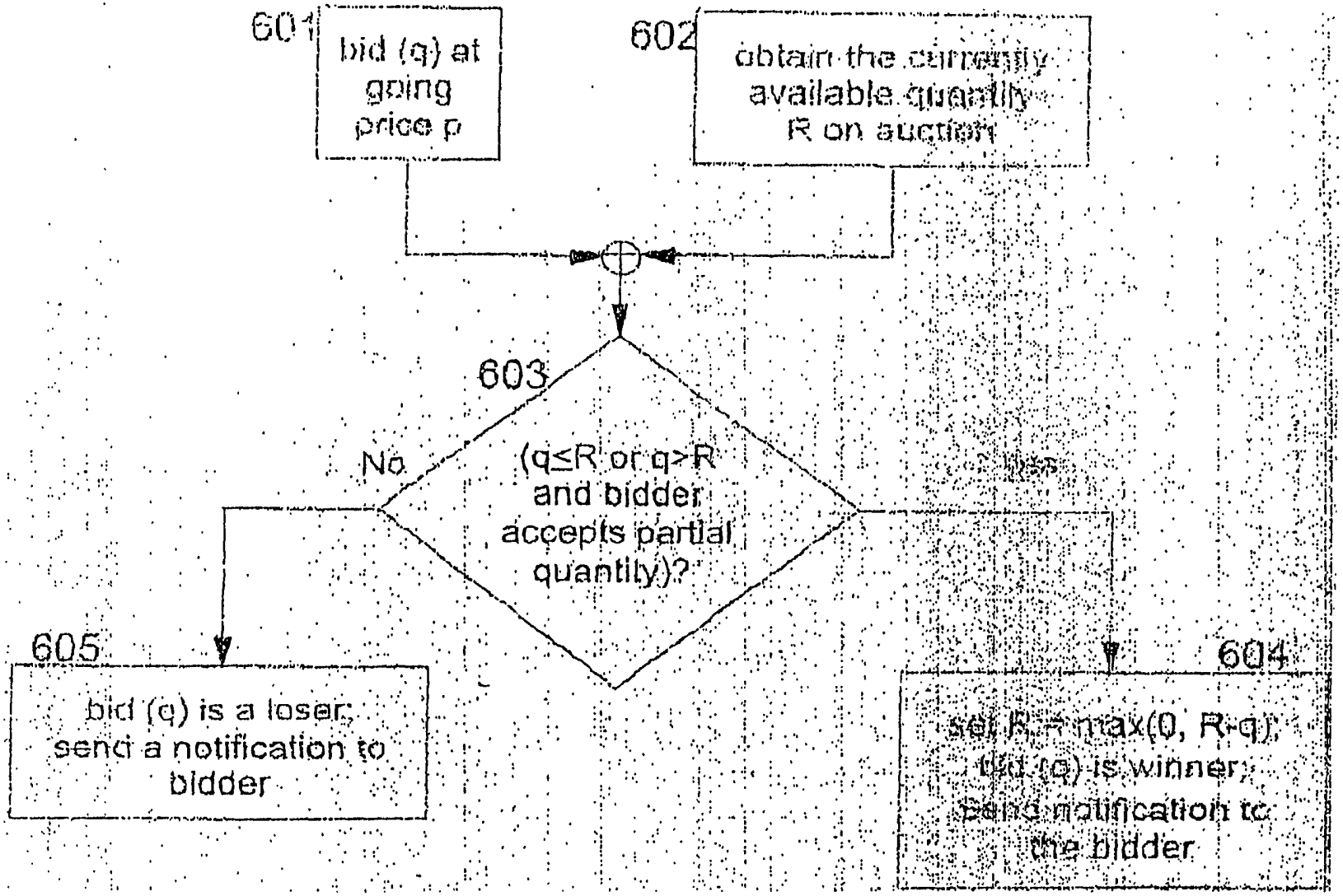

FIG. 6

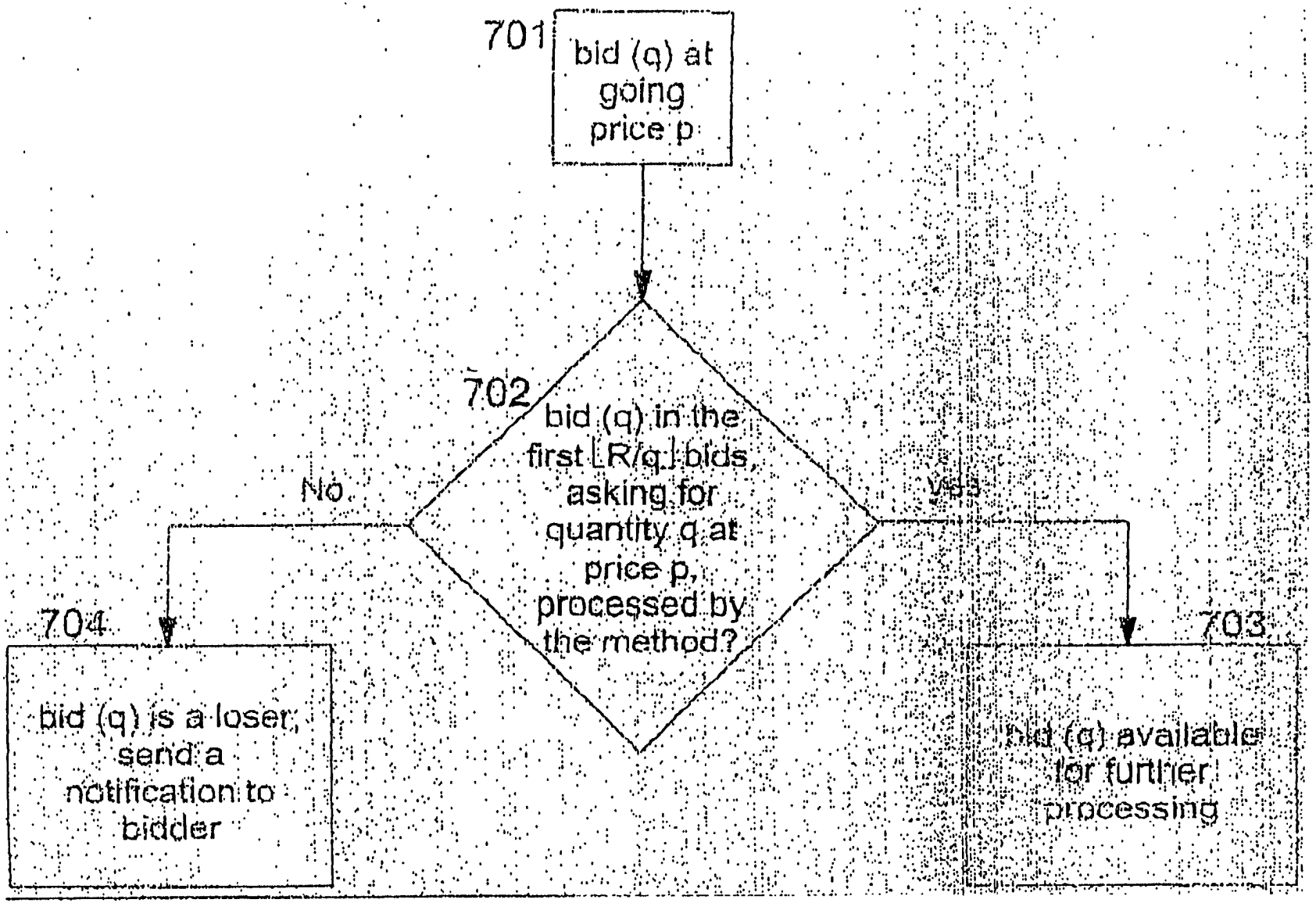

FIG. 7

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

A DISTRIBUTED BID PROCESSING METHOD FOR OPEN-CRY AND DESCENDING PRICE AUCTIONS

the specification of which (check one)

_X_ is attached hereto.

____ was filed on _____ as United States Application Number

or PCT International Application Number _____

and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application, having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	___ Yes ___ No
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	___ Yes ___ No
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	___ Yes ___ No

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below.

_____ (Application Number)	_____ (Filing Date)
_____ (Application Number)	_____ (Filing Date)

I hereby claim the benefit under 35 U.S.C. §120 of any United States Application(s), or §365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States, or PCT International application in the manner provided by the first paragraph of 35 U.S.C. §112, I acknowledge the duty to disclose information material to the patentability of this application as defined in 37 CFR §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status) (patented, pending, abandoned)
_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status) (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith (list name and registration number).

Manny W. Schecter (Reg. 31,722), Terry J. Ilardi (Reg. 29,936), Christopher A. Hughes (Reg. 26,914), Edward A. Pennington (Reg. 32,588), John E. Hoel (Reg. 26,279), Joseph C. Redmond, Jr. (Reg. 18,753), Douglas W. Cameron (Reg. 31,596), Louis P. Herzberg (Reg. 41,500), Kevin M. Jordan (Reg. 40,277), Stephen C. Kaufman (Reg. 29,551), Daniel P. Morris (Reg. 32,053), Louis J. Percello (Reg. 33,206), Jay P. Sbrollini (Reg. 36,266), David M. Shofi (Reg. 39,835), Robert M. Trepp (Reg. 25,933), Paul J. Otterstedt (Reg. 37,411) and Wayne L. Ellenbogen (Reg. 43,602)

Send Correspondence to: Stephen C. Kaufman, Intellectual Property Law Dept.

IBM Corporation, P.O. Box 218, Yorktown Heights, New York 10598

Direct Telephone Calls to: (name and telephone number) Stephen C. Kaufman (914)945-3197

Manish Gupta

Full name of sole or first inventor

Inventor's Signature _____ Date _____

P1A/246, Neb Sarai, Sainik Farms, New Delhi, India 110068

Residence

India

Citizenship

same as above

Post Office Address

Express Label EL480513373US
Date of Deposit: Feb. 17, 2000

Sandeep Juneja
Full name of second inventor

Inventor's Signature Date

G-7, Old Campus, Indian Institute of Technology, Hauz Khas, New Delhi, India 110016
Residence

India
Citizenship

same as above
Post Office Address